

Article

Landslides at Tambon Nam Phai, Thailand

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Abstract: Tambon Nam Phai is one of the areas in Thailand at risk of landslides and has been impacted by incidences in the past. Field investigations at Tambon Nam Phai revealed several causal factors: (i) the area is located in high mountain slopes with extremely braided streams; (ii) fault zones in the area contribute to cracks in the rocks leading to a high rate of weathering, (iii) prolonged heavy rainfall makes soil unstable, and (iv) increased forest encroachment on slopes. This paper highlights the current practice for landslide prediction and management in Thailand and makes recommendations to move forward to be better prepared for extreme climatic events.

Keywords: Landslide, slope monitoring, community participation, Thailand.

INTRODUCTION

Tambon Nam Phai, Amphoe Nam Phad is located in Uttaradit, a northern province of Thailand. The topography is mostly high mountain ranges and flat valleys. The villages in the area were severely affected by a landslide that occurred in September 2011, which killed 6 people and left one person missing. A total of 109 houses were fully and partly damaged and about 6,720km² of farmland were destroyed. The cost of damage caused by these landslides is estimated at more than 50 million baht or about USD1.6 million.

HAZARD FACTORS

Physical conditions such as geology, topography and climate conditions are among the main factors that contribute to landslide hazards in the area (Tatong 2019). In terms of geology, Uttaradit Province is located near the suture zone between the Sibumasu micro-continent plate and Indochina plate. This has created a topography of steep slopes in antiform and synform of sedimentary rocks in Tambon Nam Phai. The presence of numerous fault lines contributes to the high-rate of weathering due to the presence of fractured rocks. The area is also located on the rain shadow side that receives prolonged heavy rainfall almost all year round. High amounts of rainfall and steep slopes are identified as the significant factors that contribute to landslides. Another major factor is anthropogenic influence including forest encroachment. Deforestation in mountain areas contributes to slope disruption where the boundary between surficial soil and basement rock are weakened, expediting slides along such surfaces (Jotisankasa & Vathananukij, 2008).

COMMUNITY INVOLVEMENT

The Department of Mineral Resources (DMR) has installed rainwater volume and soil moisture monitoring instruments in the area. Their investigation revealed that surficial soil slide will mostly occur when the daily rainfall exceeds 100mm especially for steep slopes with an angle of more than 30°. This information is used to provide primary early warning for evacuation to safer zones. The early warning mechanism involves local residents forming a group to monitor landslides by measuring the rainwater volume, observing signs of landslides and planning landslide warning in their area. A landslide hazard map has been produced by the DMR for Tambon Nam Phai where high risk areas and safe zones are delineated based on geological features, slopes and type of surficial vegetation. The map shows three levels of landslide hazard, namely of low, moderate and high risk.

SOLUTION PATHWAYS

Prediction of landslide occurrence through rainfall and soil moisture monitoring, taking into account weather forecast from the Thailand -

Meteorological Department, may be sufficient for landslide emergency planning and evacuation action. Nevertheless, plans to develop in hazardous areas should be avoided where possible. More effort is needed to restore vegetation in the area. Illegal forest encroachment has been a serious issue in Thailand and a triggering factor for the landslides. Public awareness and implementation of a more rigorous policy is therefore necessary. Development of landslide modeling using statistical analysis based on historical landslide inventory is also important to gain deeper understanding and better prediction of landslides in the future. Such assessments will strengthen real-time warning and improve timely evacuation measures to reduce damages and losses. Currently, the DMR has been monitoring landslides in hazardous areas with the cooperation of four government agencies, i.e. the Thai Meteorological Department, the Department of Disaster Prevention and Mitigation, the National Disaster Warning Center and the Department of Water Resources, as well as public participation and engagement of the locals. Communication skills is key to tap into the knowledge from these different groups towards improving the management of landslide hazards before and after an incident. There is also a need to integrate disaster-warning systems, which are currently overseen by the ministries of Science and Technology, and Information and Communication, as well as the Meteorological Department, to ensure the effectiveness of early warning (Fredrickson, 2011).

CONCLUDING REMARKS

There is an need to improve and seek new methods to precisely predict landslide occurrences in Thailand. Engineering solutions also need to be explored to mitigate the risks, reduce damage from landslides and to restore slopes. Enhanced knowledge and understanding of the fundamentals of hazards is important to find effective solutions under extreme climate events.

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